

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 11 November 1999 (11.11.99)	
International application No. PCT/GB99/00986	Applicant's or agent's file reference J00040582 WO
International filing date (day/month/year) 30 March 1999 (30.03.99)	Priority date (day/month/year) 31 March 1998 (31.03.98)
Applicant BUCK, Roger, George et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

26 October 1999 (26.10.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer C. Carrié Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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REC'D 15 AUG 2000

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1527/PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/01118	International filing date (day/month/year) 13/04/1999	Priority date (day/month/year) 28/04/1998
International Patent Classification (IPC) or national classification and IPC E04F15/14		RECEIVED MAY 23 2001
Applicant VEXCOLT (UK) LIMITED et al.		Technology Center 2100

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 17/11/1999	Date of completion of this report 19.08.00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Flores Hokkanen. P Telephone No. +49 89 2399 2525 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01118

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-6 as originally filed

Claims, No.:

1-21 as received on 08/05/2000 with letter of 04/05/2000

Drawings, sheets:

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
☐ paid additional fees.
☐ paid additional fees under protest.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01118

☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☒ all parts.

☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-9,11-21
	No:	Claims	10
Inventive step (IS)	Yes:	Claims	17-21
	No:	Claims	1-16
Industrial applicability (IA)	Yes:	Claims	1-21
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01118

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Section IV

1. Independent claims 1 and 10 are not so linked as to form a single general inventive concept (Rule 13.1 PCT) because the process claimed in claim 1 is not specifically referred to the field limitation joint claimed in claim 10.

In fact, the field limitation joint in claim 10 has the core bonded or otherwise affixed to its side members and it has a rigid portion with a gauge width thicker than its lower limb and thinner than the free width of at least the upper limbs, where the rigid portion defines the compressed width of the joint. These constructional features are not present in the joint used in the process claimed in independent claim 1.

Section V

1. Reference is made to the following documents:
D1: FR-A-2 629 845
D2: FR-A-2 534 329
2. Document D1 is regarded as being the closest prior art to the subject-matter of independent claim 10, and insofar as this claim can be understood (see Section VIII) this document shows the following features thereof (see page 2, line 34 to page 3, line 15; page 3, lines 22-27 and Figs. 1 and 2):

A field limitation joint comprising:

- a core 5 of relatively compressible material (in D1 soft PVC is disclosed) and
- side members 12 and 13 of relatively incompressible material (in D1 rigid PVC is disclosed), the side members 12 and 13 having the core 5 bonded between them and abutting the facing members when driven between them (in D1, the side members 12, 13 abut the sides 16 and 17 of the gap 3),
- a downwards extension 6 of the side members beneath the core with the side members unified in the extension 6,
- the side members and the extension defining a divergent Y-shape in cross-section, when free of abutment with the facing members prior to driving (in D1 the joint has a divergent Y-shape), the side members 12, 13 being upper limbs of the

Y and the extension 6 the lower limb of the Y.

- the joint has a rigid portion 7 having a gauge width thicker than the lower limb of the Y and thinner than the free width of at least the distal ends of the upper limbs of the Y, and defining the design compressed with thereof (in D1, the portion 7 has the same width as the gap and defines the compressed width, during introduction of the joint the portion 7 is in contact with the sides 16, 17 of the gap).

The subject-matter of independent claim 10 is therefore not novel (Article 33(2) PCT).

3. The aforementioned novelty objection also considers the following:

- in the joint as claimed in claim 10 a rigid portion is included as constructional feature, but its position in the joint is not further defined.
- the joint in claim 10 is defined as "comprising" a number of parts. This means that further parts are not excluded. The joint of D1 has the lateral plates 14, 15 attached to its lower limbs, being the lower limb therefore thinner than the rigid portion 7.

4. Dependent claims 11 to 16 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), the reasons being as follows:

- regarding claims 11 and 12, D2 in Fig. 2 and page 3, lines 6-21 discloses a joint made out of metal 12, with a core 16 of a rubber material (which is elastomeric). Further, welding two metal plates together or bending a metal strip are merely two well known possibilities for the man skilled in the art for bringing together the metallic side members in the lower limb of the joint.

- regarding claims 13 to 15, they only involve slight changes in the form of the elastomeric insert and the metallic side members of the field limitation joint and cannot be considered as inventive.

- regarding claim 16, D2 in Fig. 1 and page 3, lines 1-5 discloses a joint being a coextrusion of a rigid plastic material 6 and a core of soft plastic material 7.

5. The combination of the features of dependent claim 17 with the features of any of the claims to which it refers is considered as involving an inventive step (Article 33(3) PCT). There is no indication that would lead the skilled man to place the rigid portion at the junction of the limbs of the joint. This allows the lower limb to be introduced into the green substrate screed, while the rigid portion fulfills its function of defining the compressed width of the joint at the gap formed between the facing members.
6. Claims 18 to 21 in combination with claim 17 fulfill the requirements of the PCT in respect of inventive step (Article 33(3) PCT).
7. Regarding independent claim 1, in the closest prior art D2, a method for fitting a field limitation joint to a faced floor is disclosed (see page 2, lines 16-34 and Fig. 1). In the method, the joint 1 is vertically driven in a gap between facing members 2, 3, the joint 1 penetrating the hardenable bed 4. The joint 1 has a U-form and an insert 7 of a soft, elastic plastic placed on its top. However, the insert 7 is not compressed due to the fitting of the joint.

The subject-matter of independent claim 1 cannot be considered as involving an inventive step (Article 33(3) PCT). The man skilled in the art would take the Y cross-section joint of D1 (see page 3, line 22-33 and Fig. 2) and use it in a faced floor as in D2, being this only a choice of possibilities among many known joints. For fitting the joint, he would follow the same steps as in D2, driving said joint into the hardenable bed at the gap between the facing members. When the top of the joint of D1 (see Fig. 2) is flush with the surface, the insert of the joint 5 is compressed.

5. Dependent claims 2 to 9 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:
 - regarding claim 2, it is obvious that spaces between facing members not receiving a joint are to be grouted prior to the insertion of the joint, so to avoid any displacement of the facing members.

- regarding claims 3 and 4, cutting the hardenable bed before inserting the joint, or the hardenable bed being cut by the joint being inserted are well known possibilities for the man skilled in the art.
- regarding claims 5 and 6, to regulate a gap by laying a spacer between the facing members is well-known. That the spacer is to be removed is obvious, otherwise the joint could not be inserted.
- regarding claim 7, the use of the joint to regulate the gap between the facing members is equivalent to the use of a spacer and cannot be regarded as inventive.
- regarding claim 8, the methods for stabilisation of the facing members claimed are all well-known for the man skilled in the art.
- regarding claim 9, spacing the facing members identically is an obvious choice.

Section VII

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 and D2 is not mentioned in the description, nor are these documents identified therein.
2. Independent claims 1 and 10 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (documents D2 and D1, respectively) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Section VIII

1. The relative terms "relatively incompressible material" and "relatively compressible

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/01118

material" used in independent claim 10 are ambiguous and leave the reader in doubt as to the meaning of the technical feature to which they refer, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT). In fact, it is not clear to which degree one material should be more or less compressible (or incompressible) in relation to the other. It even leaves the possibility open that, for example, both the core material and the side members material are compressible, where the difference lies in that the core is more compressible in relation to the side members.

2. Independent claim 1 claims a method for fitting a field limitation joint where first a hardenable bed is laid in a floor or wall. The use of the word "hardenable" leaves doubt to which extent the bed is hardened when the joint is to be fitted, therefore the claim lacks clarity (Article 6 PCT).

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CLAIMS:

1. A method of fitting a field limitation joint to a faced floor or wall, the joint having a Y cross-section with compressible material in the space between the divergent upper limbs of the Y, the method consisting in the steps of:
 - 5 • laying a hardenable bed on the floor or wall,
 - setting flat facing members on the hardenable bed in an array, with a defined field limitation line at gap between certain of the arrayed members, the gap having a defined width, which is less than the free width of the upper limbs of the Y,
 - 10 • inserting the field limitation joint into one of the gaps to a depth such that upper limbs of Y rest on the facing members at the gap and the joint protrudes proud of the facing members and
 - driving the joint into the gap until its top is flush with the surface of the facing members, the lower limb of the Y penetrating the hardenable bed, the upper limbs of the Y being displaced towards each other with the compressible material between the upper limbs being compressed.
 - 15
2. A method as claimed in claim 1, wherein the spaces between the facing members which are not to receive a joint are grouted prior to fitting of the joint.
3. A method as claimed in claim 1 or claim 2, wherein the hardenable bed is cut
20 along the field limitation line prior to inserting of the joint, the cut preferably having adhesive applied into it.
4. A method as claimed in claim 1 or claim 2, wherein the hardenable bed is cut by the field limitation joint being inserted into the gap between the facing members.
5. A method as claimed in any preceding claim, wherein the gap defining the
25 field limitation line is regulated by laying the facing members along the line with a spacer of a defined width therebetween.
6. A method as claimed in claim 5, wherein the spacer is removed prior to insertion of the joint.
7. A method as claimed in claim 5, wherein the spacer is a portion of the joint,
30 which is narrower than the free width of the upper limbs of the Y, preferably a lateral swelling at the junction of the Y, the joint being driven home once the members along it have been stabilised.

11 09 05 00

8. A method as claimed in claim 7, wherein the stabilisation is by at least partial hardening of the bed and/or the use of spacers between facing members other than at the field limitation lines and/or by grouting of the facing members.

9. A method as claimed in any preceding claim, wherein all the facing members
5 are spaced identically and the joint has a compressed width equal to the spacing of the tiles which are grouted.

10. A field limitation joint for the method of any preceding claim, the joint comprising:

- a core of relatively compressible material and
- 10 • side members of relatively incompressible material, the side members having the core bonded or otherwise affixed between them and abutting the facing members when driven between them,
- a downwards extension of the side members beneath the core with the side members unified or abutting in the extension,
- 15 • the side members and the extension defining a divergent Y-shape in cross-section, when free of abutment with the facing members prior to driving, the side members being upper limbs of the Y and the extension the lower limb of the Y

characterised in that

- 20 • the joint has a rigid portion having a gauge width thicker than the lower limb of the Y and thinner than the free width of at least the distal ends of the upper limbs of the Y, and defining the design compressed width thereof..

11. A field limitation joint as claimed in claim 10, the core being an elastomeric insert and the side members being metallic, the metal side members being welded
25 together in the lower limb of the Y.

12. A field limitation joint as claimed in claim 10, the core being an elastomeric insert and the side members being metallic, the metal side plates being rolled from a single strip and bent double at the bottom of the lower limb of the Y.

13. A field limitation joint as claimed in claim 11 or claim 12, wherein the
30 elastomeric insert has a lower rib connected to an upper strip by a thinner section, the metal side plates being rolled to shape to captivate the lower rib.

14. A field limitation joint as claimed in claim 13, wherein the elastomeric insert is a co-extrusion of a harder material in the rib and a softer material in the upper strip.

11 09 05 00

15. A field limitation joint as claimed in any one of claims 11 to 14, wherein the upper limbs of the Y have inward deformations to captivate the elastomeric insert.

16. A field limitation joint as claimed in claim 10, the joint being a co-extrusion of a relatively rigid plastics material comprising the limbs of the Y and a less rigid

5 plastics material between the upper limbs of the Y comprising the core.

17. A field limitation joint as claimed in anyone of claims 10 to 16, , wherein the said rigid portion is a lateral swelling at the junction of the limbs of the Y.

18. A field limitation joint as claimed in anyone of claims 10 to 17, wherein the design compressed width of the joint is the design grouting spacing of the facing

10 members to which the joint is to be fitted.

19. A field limitation joint as claimed in anyone of claims 10 to 18, wherein the lower limb of the Y has spaced apertures therethrough for filling with adhesive in a cut in the hardenable bed.

20. A field limitation joint as claimed in anyone of claims 10 to 19, wherein the distal ends of the upper limbs diverge by between one quarter and one half as much again as the design width of the gap to which the joint is to be fitted.

15 21. A field limitation joint as claimed in claim 14 or anyone of claims 15 to 20 as appendant thereto, wherein the harder material has a Shore Hardness between 50° and 60° and the softer material has a Shore Hardness between 15° and 35°.

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PCT/PTO 22 MAR 2001
09/623316

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference J00040582 WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/00986	International filing date (day/month/year) 30/03/1999	Priority date (day/month/year) 31/03/1998
International Patent Classification (IPC) or national classification and IPC H04Q11/04		
Applicant BRITISH TELECOMMUNICATIONS public limited company		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 26/10/1999	Date of completion of this report 03.08.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Staessen, B Telephone No. +31 70 340 2818 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/00986

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1,2,4-13	as published		
3	as received on	02/05/2000 with letter of	02/05/2000

Claims, No.:

7-18	as published		
1-6	as received on	02/05/2000 with letter of	02/05/2000

Drawings, sheets:

1/7-7/7	as originally filed
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Drawings, No.:

1/7-7/7	as published
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2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/00986

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Yes: Claims 1-18
	No: Claims
Inventive step (IS)	Yes: Claims 1-18
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-18
	No: Claims

2. Citations and explanations**see separate sheet****VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

see separate sheet

INTERNATIONAL PRELIMINARY

International application No. PCT/GB99/00986

EXAMINATION REPORT - SEPARATE SHEET

Reference is made to the following documents in this report

D1: WO97/48238 (Northern Telecom)

D2: US4782157 (J.F. Bernardis)

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The present application satisfies the criteria set forth in Article 33(2) PCT because the subject-matter of independent claims 1, 8 and 9 involves an inventive step (Rule 65(1) (2) PCT).

Claim 1: The invention relates to a method of communications employing a predetermined communications protocol defining respective responses to predetermined events, as for example defined in D2 (see e.g. abstract and fig.1 (ref. "28"))

The invention is characterized in that

the method separates said protocol into a first group of responses to corresponding first events, and a second group of responses to corresponding second events, wherein said first events occur frequently relative to said second events: storing said first group at first communications terminal, storing at least said second group at a store remote from said first terminal, and interconnected therewith via a communications channel; communicating from said first terminal using said first group of said protocols; on detecting an event other than one of said first events at said first terminal, signalling event-handling data from said store to said first terminal; and communicating from said first terminal using said event-handling data.

These characterizing features allow to solve the problem that a mobile terminal (e.g. PDA or Java enabled mobile phones) finds it difficult to store large communications programs because it wants to reduce the size (power consumption; weight; complexity) of its local store as explained in the description at page 2, lines 14 - 19.

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EXAMINATION REPORT - SEPARATE SHEET

The problem is solved by storing the less frequent (exceptional) events at a remote store connected to the network. Only a core set of instructions is stored locally.

None of the documents cited in the International Search Report hints at such a problem or suggests a similar solution using equivalent features for solving the above mentioned problem.

Claim 8 discloses the same features as in claim 1 but defined as a system.

Claim 9 discloses the same features as in claim 1 but defined as a terminal.

The same argumentation as above applies also to the claims 8 and 9.

The dependent claims 2 - 7 and 10 - 18 are truly dependent on claims 1, 8 or 9.

Re Item VII**Certain defects in the international application**

1) It is believed that document D2 discloses the closest prior art. Contrary to the requirements of Rule 5.1 (a)(ii) PCT, the relevant background art disclosed in the document D2 is not mentioned in the description, nor is this document identified therein.

2) The independent claims are not cast in the two-part form as required by Rule 6.3(b) PCT.

3) The description is not in conformity with the claims. Thus, the requirements of Rule 5.1 (a)(ii)(iii) PCT are not fulfilled.

4) No reference signs in parentheses are inserted in the claims to increase their intelligibility. Therefore the requirements regarding Rule 6.2(b) PCT are not met.

In one embodiment, the data comprises code which the terminal can store and execute as an additional action, for use in future communications sessions. Thus, the core of actions stored at the terminal can be augmented by the addition of those extra actions needed to deal with only those exceptional events which
5 have occurred in the past (and may be likely to recur). The storage may be long-term, or the terminal may discard little-used stored extra actions.

In another embodiment, the data comprises instructions executed by the terminal to handle the exceptional event, but not stored for future use. Thus, local storage requirements are minimised.

10 The store and/or the terminals may initially determine whether the stored core behaviour is current, and if not, current actions may be downloaded from the store to the terminals for future use. At this point, it may be mentioned that WO 97/048238 discloses a network switch (not a terminal) which operates conventional communications protocols, and is controlled from a separate service control unit for
15 enhanced service calls.

Other aspects, embodiments and preferred features of the invention will be apparent from the following description and claims, together with the advantages thereof.

Embodiments of the invention will now be described, by way of example
20 only, with reference to the accompanying drawings in which:

Figure 1 is a block diagram showing schematically the elements of a communications network embodying a first embodiment of the present invention;

Figure 2 is a block diagram showing schematically the elements of a terminal forming part of Figure 1;

25 Figure 3 is a block diagram showing schematically the elements of a network server forming part of Figure 1;

Figure 4 is a flow diagram showing schematically the overall flow of operations of the terminal of Figure 2 during a call;

Figure 5a is a flow diagram showing schematically the process of
30 operation of the terminal of Figure 2 following the process of Figure 4 on encountering an unknown event;

Figure 5b is a flow diagram showing schematically the flow of operation of the network server of Figure 3 in response to the performance of Figure 5a by the terminal;

35 Figures 6a and 6b are schematic diagrams illustrating the structure of messages exchanged in the first embodiment;

CLAIMS

1. A method of communications employing a predetermined communications protocol defining respective responses to predetermined events, comprising:
- 5 separating said protocol into a first group of responses to corresponding first events, and a second group of responses to corresponding second events, wherein said first events occur frequently relative to said second events;
- storing said first group at a first communications terminal, storing at least said second group at a store remote from said first terminal, and interconnected
- 10 therewith via a communications channel;
- communicating from said first terminal using said first group of said protocols;
- on detecting an event other than one of said first events at said first terminal, signalling event-handling data from said store to said first terminal; and
- 15 communicating from said first terminal using said event-handling data.
2. A method according to claim 1, in which, when the detected event is of the group of second events, said event-handling data comprises at least the responses of said second group which correspond thereto.
- 20
3. A method according to claim 2, in which the first terminal is arranged to store those responses of said second group received from the store on receipt thereof, for future use in response to further occurrence of the corresponding event.
- 25
4. A method according to claim 3, in which the first terminal is arranged to delete said stored responses under predetermined conditions.
5. A method according to claim 4, in which the predetermined conditions
- 30 comprise non-use of the stored responses for a predetermined period of use.
6. A method according to claim 1, in which said event-handling data comprises data defining instructions for handling the detected event.

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: METHOD AND APPARATUS FOR SIGNALLING BETWEEN TERMINALS**(57) Abstract**

A method of communications employing a communications protocols defining respective responses to predetermined events, comprising: separating said protocol into a first group of behaviours defining responses to corresponding first, relatively frequently occurring, events, and a second group of behaviours defining responses to corresponding second, relatively infrequently occurring, events; Storing said first group at a first communications terminal, storing at least said second group at a store remote from said first terminal, and interconnected therewith via a communications channel; communicating from said first terminal using said first group of said protocols; on detecting an event other than one of said first events at said first terminal, signalling event-handling data from said store to said first terminal; and communicating from said first terminal using said event-handling data.

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METHOD AND APPARATUS FOR SIGNALLING BETWEEN TERMINALS

This invention relates to methods and apparatus for signalling between a first terminal and a second, via a network employing a signalling protocol.

5 One such access signalling protocol is defined in ITU Q2931, entitled "Broadband Integrated Services Digital Network (B-ISDN) - Digital Subscriber Signalling System No 2 (DSS 2) - User-Network Interface (UNI) Layer 3 Specification for Basic Call/Connection Control", well known, and available from the International Telecommunications Union, of Geneva, Switzerland.

10 This protocol defines the signalling procedures to be followed by a first terminal in accessing a second to set up and operate an ISDN communications session.

Many conditions may exist or occur during such a communications session. For example, the remote terminal may be busy, or unable to signal at a
15 certain rate, or unobtainable (damaged or switched off). Alternatively, the network may be congested, or a busy tone may be generated from the local exchange. Data may be lost, or delayed, or corrupted in passage.

Many such protocols, such as Q2931, define a state machine; that is to say, a machine that can exist only in one of a number of predefined states, and
20 can move from state to state in response to the occurrence of a predetermined event or combination of events. Actions are performed in moving the terminal from one state to another.

Such events may be, for example, the receipt of a defined signal from the second terminal via the network, or the elapsing of a predetermined time in the
25 state. The actions taken in response may involve external signalling, or resetting an internal timer, and moving to a new state. The protocol defines the set of states, and the set of actions, and the events triggering the performance of the actions and changes of state.

A simple call set-up sequence starts with a first terminal moving from the
30 on-hook state to a first active state in response to user action, dialling a second terminal, and then entering a wait state awaiting the next event. The two terminals pass through a succession of such states during handshaking signalling, until the call is set up.

If unusual conditions in the network or at either terminal occur, however, it is necessary to use appropriate exception-handling behaviour, or else one or both terminals may "hang", awaiting a "normal" event which will never occur. Such conditions will be interpreted as events, corresponding either to receipt of a
5 "signal" (which may be noise) or elapsing of a time period within which the normal signal should have been received.

The total number of such unusual conditions is large, and each may require different handling depending on the state the terminal is in at the time. This leads to a large number of responses in a set such as Q2931. Encoding such
10 protocols as an operating control program for a terminal may require, for Q2931, 200 kilobytes to 1 Megabyte of executable code.

It might be supposed that the widespread availability of cheap memory and disk drive components would readily accommodate a program of such a size.

The present inventors have realised, however, that new types of
15 computing devices such as Network Computers (NCs), Personal Digital Assistants (PDAs), and Java-enabled mobile phones will find it difficult to store large communications programs since they generally, for reasons of size and cost, lack a magnetic media drive such as a hard disc drive, and have small PROM, EPROM or flash memory devices.

20 Further, the present inventors have realised that within a given communications protocol such as Q2931, a very large proportion of the actions (more than half) are for handling exceptional events, and only a relatively small core of actions are routinely used.

Accordingly, the present invention provides a system in which a terminal
25 only stores code to execute this core behaviour. The remainder of the responses, for handling unusual events, are stored elsewhere at a store in the network (for example at a Network Server computer forming a node of the network). On encountering an exceptional event, the terminal receives data from the store to enable it to handle the event.

30 The terminal may signal to the store to request such data on encountering an exceptional event. The signal may indicate the event, and the state of the terminal on encountering it.

In one embodiment, the data comprises code which the terminal can store and execute as an additional action, for use in future communications sessions. Thus, the core of actions stored at the terminal can be augmented by the addition of those extra actions needed to deal with only those exceptional events which
5 have occurred in the past (and may be likely to recur). The storage may be long-term, or the terminal may discard little-used stored extra actions.

In another embodiment, the data comprises instructions executed by the terminal to handle the exceptional event, but not stored for future use. Thus, local storage requirements are minimised.

10 The store and/or the terminals may initially determine whether the stored core behaviour is current, and if not, current actions may be downloaded from the store to the terminals for future use.

Other aspects, embodiments and preferred features of the invention will be apparent from the following description and claims, together with the
15 advantages thereof.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a block diagram showing schematically the elements of a communications network embodying a first embodiment of the present invention;

20 Figure 2 is a block diagram showing schematically the elements of a terminal forming part of Figure 1;

Figure 3 is a block diagram showing schematically the elements of a network server forming part of Figure 1;

25 Figure 4 is a flow diagram showing schematically the overall flow of operations of the terminal of Figure 2 during a call;

Figure 5a is a flow diagram showing schematically the process of operation of the terminal of Figure 2 following the process of Figure 4 on encountering an unknown event;

30 Figure 5b is a flow diagram showing schematically the flow of operation of the network server of Figure 3 in response to the performance of Figure 5a by the terminal;

Figures 6a and 6b are schematic diagrams illustrating the structure of messages exchanged in the first embodiment;

Figure 7 is a flow diagram replacing that of Figure 5a in a second embodiment of the invention;

Figure 8 is a diagram illustrating the structure of a message replacing that of Figure 5b in a third embodiment of an invention;

5 Figure 9 is a flow diagram illustrating the operation of the terminal in performing a downloaded subroutine according to the third embodiment;

Figure 10a is a flow diagram illustrating an initial process formed prior to that of Figure 4 at the terminal in a fourth embodiment of the invention; and

10 Figure 10b is a flow diagram showing schematically the corresponding process performed in response at the network server in the fourth embodiment.

First embodiment

Referring to Figure 1, the present embodiment comprises a first terminal 10, a second terminal 20, and a telecommunications network 30 including a network node 40.

15 The term "terminal" herein indicates that the terminals are external to the network (i.e. are at network terminations) rather than implying any particular structural or functional limitations.

The first terminal 10 comprises a Network Computer. Referring to Figure 2, it consists of a control circuit 11 (e.g. a microprocessor or microcomputer such as a Pentium 2 processor available from Intel, or a StrongARM reduced instruction set computer (RISC) available from Acorn Ltd).

20 Coupled to the control circuit 11 (e.g. via buses) are an instruction store 12 (comprising, for example, a ROM or an EPROM or a Flash programmable memory) holding the operating system, applications programs and communications programs for the terminal 10, and a read/write working memory 13 (e.g. a RAM) for retaining data and transitory programs.

The operating system may comprise Windows 95 (TM) or Windows CE (TM) and is arranged to accept a downloaded executable program subroutine, store it in the working memory 13, and execute it.

30 Further provided is a communications port 14, comprising a physical connector for connection to an ISDN line 31 connected to the network 30, and a pair of logical ports 15, 16, one (15) for connection to a data channel (e.g. an ISDN B channel) and one for connection to a signalling channel (e.g. an ISDN D

channel). Other elements provided may comprise user output devices such as a loudspeaker, and user input devices such as a keyboard, cursor control device (e.g. mouse) or microphone. Where the device is intended as a set-top box, for co-operation with an existing television set, it further comprises a video output port, which may be a SCART connector port, or an RF-modulated aerial cable connector socket.

Held within the instruction store 12 is executable code for causing the control circuit 11 to perform a subset of the actions of the User Access Side of the Q2931 protocol, by sensing incoming signals on the data and signalling ports 15, 16 and generating and supplying outgoing signals to those ports.

The second terminal 20 may be identical to the first for carrying out a bi-directional communications session with the first (e.g. a digital videotelephony session), or may comprise for example a computer carrying files of data to be downloaded by the first (using, for example, File Transfer Protocol (FTP)).

The telecommunications network 30 is an ISDN network in this embodiment, comprising a plurality of Asynchronous Transfer Mode (ATM) switching nodes 32 interconnected by high-bandwidth links (e.g. fibre optic cables) carrying data in ATM cells (i.e. packets).

Referring to Figure 3, the network node 40 comprises a computer 41 and a store 42 storing data corresponding to executable code for the Q2931 signalling protocol. At the same (or a different) network node 40 is a computer (e.g. computer 41) arranged to implement the Network Access Side (NAS) actions of the Q2931 set.

Similarly, the second terminal 20 executes the User Access Side (UAS) actions for Q2931. Thus, on setting up a new session from the first terminal to the second, the terminal 10 and computer 41 are able to carry out a signalling dialogue, to enable the computer 41 to set up a connection from the first to the second.

The actions stored in the form of executable code within the store 13 comprise:

30

Section 5.1 - Normal Call Behaviour except:

5.1.1 Where Time-out conditions occur

5.1.2.1 Where VCI is not available

5.1.2.3 Where VPCI or VCI not available

5.1.4 Where requested QoS not available

5.1.4

- 5 5.1.5 Where requested service is not authorised or not available or Time-out conditions occur

5.1.8

Section 5.2 - Normal Call Behaviour except:

10

5.2.1 Where Time-out conditions occur

5.2.2.2 Where no compatible user equipment exists

5.2.3 Where value not supported by network

5.2.3.4 Where no VCI available

- 15 5.2.3.5 Where specified VPCI or VCI is not available

5.2.6 Where requested QoS cannot be provided

5.2.5.7 Where user is incompatible

5.2.5.4

5.2.7 When Time-out condition occurs

20

Section 5.4 - Normal Call Behaviour except:

5.4.2

5.4.3 Where Time-out condition occurs

- 25 5.4.4 Where time-out condition occurs

5.4.5

30 In the foregoing, it will be understood that "VCI" indicates an ATM Virtual Channel Indicator; "VPCI" indicates an ATM Virtual Path Connection Indicator, and QoS indicates Quality of Service.

The progress of a typical call will now be described with reference to Figure 4. In a step 110, the control circuit 11 performs call set up signalling. The signals are recognised by the network server 40, which creates a connection to the

second terminal 20. If, in a step 112, an exceptional event is detected (for example, a Time out, or an "error" or "busy" signal) due, for example, to network damage or congestion, the processor 11 signals to the network server 40 in step 124 as will be described in greater detail below.

5 When the call set up is completed (step 114), the call session takes place (step 116). After completion of the call session, call clear down signalling is commenced to close down the call. (step 118). If, during the call clear down signalling, an unknown event is encountered (step 120) the terminal 10 signals to the network server 40 in step 124 as will be described in greater detail below.

10 Thus, if no unusual or unexpected events occur, call set up, progress and clear down is exactly like a normal ISDN call session.

Referring now to Figure 5a, where an unexpected event occurs, in step 124 the control circuit 11 generates a request message and transmits the request message in step 126 to the network server via the signalling port 16.

15 Referring now to Figure 6a, the request message 200 includes a field 202 indicating the current state of the terminal 10; field 204 indicating whether the event was a time-out, a received message or signal or a parameter (i.e a field within a signal or message); and respective fields 206 ,208, and 210 indicating, respectively, the identity of the input signal, the time-out, or the parameter(s)
20 which caused the unknown event.

Referring now to Figure 5b, the network server 40 receives the request signal in a step 134, and analyses the state of the terminal 10 and the identity of the unknown event, to determine what the event was, using the protocol code store 42, in a step 136. Next, in step 138, the network server 40 retrieves from
25 the protocol code store 42 data indicating what the correct response according to Q2931 should have been, and in step 140, the network server creates and sends an exception response message 250.

Referring now to Figure 6b, the response message 250 comprises a task list field 252 listing the tasks that the access signalling process must perform next;
30 an output field 254 containing any output message that needs to be sent in response to the unknown event; and a next state field 256 indicating the next state according to the Q2931 protocol after performance of the tasks and

outputting of the output message. These collectively form the action taken in response to the event according to the protocol.

The terminal 10 receives the response message 250 in a step 128 of Figure 5a, and in step 130 the control circuit 11 executes the contents of the response message, by performing the listed tasks in field 252, outputting any message in the field 254 via the signalling port 16, and then entering the next state identified in the field 256.

In this embodiment, therefore, the control program stored within the program store 12 includes routines for interpreting the tasks downloaded within the task list field, and causing the control unit 11 to execute these, and for causing the control unit to put the terminal into one of the predetermined states of the Q2931 protocol, and for causing the control unit to output the contents of the output signal field downloaded from the network at the signalling port 16, effectively parsing and executing the downloaded instructions from the network server 40 in real time as if they were a stored protocol for dealing with the unknown event.

Thus, in this embodiment, there is no need for the terminal 10 to store additional information above the code defining the "core" behaviour within the code store 13, which may therefore be kept compact.

20 Second Embodiment

Although the exceptional events for which the terminal 10 does not store response actions are typically relatively rarely occurring in the first embodiment, nonetheless some types of such event may, if they occur once, recur later (for example because of some recurrent or persistent network congestion or damage).

25 Accordingly, in this embodiment, the response message from the network 31 includes data which is stored at the terminal 10 to enable the terminal 10 to recognise and handle the event concerned in future without returning to the network server 40. This embodiment may therefore improve the response speed of the terminal 10 in future, and may lead to lower signalling volumes over the network 30 if the exceptional event recurs frequently. In more general terms, the core actions stored on the terminal 10 are updated and adapted to reflect the fact that conditions initially thought to be exceptional may in fact become routinely or frequently encountered.

In this embodiment, the hardware components are the same as in the first and will be referred to by the same reference numerals. However, as shown in Figure 7, the process of Figure 5a is modified to include an additional step 132 of storing the response data within the read/write memory 13, as a supplement to the
5 stored control program.

After the request message is generated in step 124, in step 125 it is used to search the memory 13 for earlier stored messages having the same current terminal state and unknown event. If (step 127) no such stored data is located (indicating that the unknown event has not previously been encountered)
10 processing continues at step 126 as described in the first embodiment. If, on the other hand, it is determined that the memory 13 includes stored data indicating that the same unknown event was encountered in the same terminal state previously, then the response data stored together with that request message data (in a previous execution of step 132) are retrieved in step 129, and executed in
15 step 131, in the same manner as the execution in step 130 described above in the first embodiment.

The downloaded event handling data described in the first embodiment could simply be stored in step 132, together with the contents of the request message to which it was a response.

20 In this case, on future occurrences of an unknown event, the processor 11 is arranged to search the read/write memory 13 for a stored request message having an unknown event and current terminal state matching those currently encountered, and to retrieve and parse the corresponding response message which was stored together therewith.

25 In this case, the second embodiment functions exactly like the first embodiment but with interrogation of the memory 13 serving in place of signalling to the network server 40 where the unknown event has been encountered previously.

Third Embodiment

30 Whereas, in the second embodiment, the event handling data is stored in the form of instructions to be parsed and executed by a high-level interpreter program at the terminal 10, in this embodiment, low-level executable code for implementing the action for handling the unknown event is downloaded from the

network server 40, the response message 200 of Figure 6b being replaced by that 201 of Figure 8 comprising serialised code for execution.

The code may be in the form of an intermediate programming language representation, such as Java (TM) code or Pascal P-code, which can be executed
5 by a "virtual machine" interpreter or compiler forming part of the control program stored in the control program store 12.

Alternatively, the code may be low-level machine code specific to the architecture of the control circuit processor 11, in which case the request message of Figure 6a is modified to include a field indicating the processor type of the
10 control circuit 11, and the network server 40 is arranged either to store multiple encoded programs for executing the protocol, in the machine languages of different common processors (e.g. Intel processors, Motorola processors, Acorn processors and the like), or to store multiple compilers for generating code for each such processor from a single stored high-level representation of the protocol.

15 On receiving the response message of Figure 8, the control circuit 11 stores the code in the memory 13. The control program for executing the actions is therefore distributed between the original "core" action modules stored in the store 12, and the downloaded modules stored in the memory 13. Referring to Figure 9, the stored module consists generally of a logical test (step 302) of the
20 processor state and the unknown event followed, if they match, by execution (step 304) of the remaining downloaded code to handle the action, and if not, by a RETURN statement.

Thus, in this embodiment, no additional parsing program is required within the terminal 10 for executing the downloaded event handling data, which may be
25 advantageous where only small numbers of exceptional events are expected to occur.

Preferably, in this embodiment, to prevent over-accumulation of very rarely used actions within the memory 13, the control circuit 11 is arranged to count the number of communications sessions initiated since downloading each action
30 module and the number of occasions on which that module has been executed, and to erase from the memory 13 any module which is not executed within a predetermined number of communications sessions (for example, 100 sessions).

Thus, events which are genuinely rare do not, over the long term, cause the reduction in storage capacity in the terminal 10. Other measures of the frequency of use of the downloaded modules could, of course, be substituted for that just described.

5 Fourth Embodiment

In this embodiment, the apparatus is as described in the preceding embodiments and the same reference numerals will be employed.

In this embodiment, the operation of the terminal 10 described in relation to Figure 4 is modified as shown in Figure 10a, and the network server 40
10 performs the additional process of Figure 10b.

In this embodiment, it is noted that the core signalling behaviour may change over time. This may arise firstly because the Q2931 protocol is varied or added to, or it may arise because events which were initially infrequent become part of the core signalling behaviour, and *vice versa*.

15 Accordingly, in this embodiment, the core actions stored within the instructions store 12 carry a version number. Over time, the core behaviour may change and on each such change, the version number is incremented. The program store 12 in this embodiment is electrically reprogrammable by the terminal 10.

20 On each attempt to set up a call by or to the terminal 10, the terminal 10 signals to the network server 40 a message which includes the version number of the core actions it currently stores, in step 102 of Figure 10a. In step 152 of Figure 10b, this message is received at the network server 40 and in step 154, the network server 40 transmits back a message indicating the current version number
25 of the core actions (i.e. the version number stored in relation to the core actions stored at the network server 40 itself).

In a step 104 of Figure 10a this is received by the terminal 10 and in a step 106 the control circuit 11 compares the two version numbers. If they match, control circuit 11 resumes with the process of Figure 4 described above to execute
30 any one of the first, second or third embodiments as already described. The same test is performed in step 156 at the network server 40.

If the version numbers do not match, then the terminal 10 and network server 40 communicate in steps 108 and 158 to transmit a current version of the

actions, as executable code, from the network server 40 to be stored in the memory 12 for future use by the terminal 10. The process of Figure 4 in relation to the first, second or third embodiments described above is then performed using the newly downloaded set of core actions.

5 Thus, the core action set stored on each of the terminals is updated to be current prior to each communications session.

 Rather than downloading an entire replacement executable core program, it would be possible to download a list of those action subroutines or modules which have changed, together with the replacement code for those modules,
10 enabling the control circuit 11 to amend the existing control program by deletion and replacement of parts of the program, rather than completely replacing it. Alternatively, a self-executing program for performing the same operation could be downloaded from the network server 40.

 One or both (or, for a multi-terminal session such as an audio or video
15 conference, all) of the terminals may embody this aspect of the invention and accordingly such protocol updating may be performed on some or all of the terminals.

Other Embodiments And Variations

 It will be clear to the skilled reader that the foregoing embodiments are
20 merely by way of example and that many other alternatives and modifications are possible within the spirit of the invention. Accordingly, the present application is not limiting to the above disclosed embodiments but encompasses any such variations or modifications, and any or all novel subject matter contained herein.

 For example, rather than storing the actions as executable code at the
25 terminals, it is possible to store them, and, by the same token, to download them, in the form of high-level representations such as sequence description language (SDL) code, provided a suitable interpreter program is resident on the terminal.

 Although the invention has been described in the context of a terminal comprising a set-top box for communication with a television set via a video
30 output port, it will be clear that it is applicable to other devices with limited memory or storage (for example having no hard drive or tape drive) such as personal digital assistants (PDAs), notepad and handheld computers, mobile phones, and the like. It is also applicable, of course, to devices without limited

memory and storage capacity, such as main frame computers, workstations or servers where it is desired to achieve the benefits of a readily upgradable protocol.

Although the invention has been described in relation to the Q2931 ISDN access protocols, it will immediately be apparent that it is equally applicable to the
5 access signalling protocols of any other communications standard such as the GSM mobile communications protocol or its equivalents in other countries, and to communications protocols other than for access and cleardown signalling.

Although in the foregoing the terminal 10 signals to the network server 40 to indicate the unknown event and terminal state, it is possible that in some
10 networks or under some conditions, the network server may itself be able to infer these from records of the signalling which has taken place held within the network itself and may therefore be able to supply the event handling data without requiring an initiating signal from the terminal 10.

Similarly, the network server 40 may be able to infer that certain events
15 for which there is no responsive action within the core behaviour (e.g. the likelihood of certain types of busy state) may occur based on knowledge of current network traffic conditions, or (e.g. that the terminal makes use of rare signalling procedures) from knowledge about the other terminal involved, or the nature of the session being set up

20 Accordingly, request signalling from the terminal 10 is not essential to the operation of the invention.

Although updating only the core behaviour is described in the above embodiments, it would equally be possible to implement the entire signalling protocol where the storage available to each terminal is large enough, and to
25 perform the process described in relation to the fourth embodiment to update the entire protocol. Accordingly, the feature of storage of only a limited subset of the protocol is not essential to the above described fourth embodiment, and protection is or may separately be sought for the fourth embodiment independently of such a feature.

CLAIMS

1. A method of communications employing a predetermined communications protocol defining respective responses to predetermined events, comprising:
 - 5 separating said protocol into a first group of responses to corresponding first, relatively frequently occurring, events, and a second group of responses to corresponding second, relatively infrequently occurring, events;
storing said first group at a first communications terminal,
storing at least said second group at a store remote from said first terminal, and
 - 10 interconnected therewith via a communications channel;
communicating from said first terminal using said first group of said protocols;
on detecting an event other than one of said first events at said first terminal, signalling event-handling data from said store to said first terminal; and
 - 15 communicating from said first terminal using said event-handling data.
2. A method according to claim 1, in which, when the unknown event is of said second group, said event-handling data comprises at least the responses of said second group which correspond thereto.
- 20 3. A method according to claim 2, in which the first terminal is arranged to store those responses of said second group received from the store on receipt thereof, for future use in response to further occurrence of the corresponding event.
- 25 4. A method according to claim 3, in which the first terminal is arranged to delete said stored responses under predetermined conditions.
5. A method according to claim 4, in which the predetermined conditions
- 30 comprise non-use of the stored responses for a predetermined period of use.
6. A method according to claim 1, in which said event-handling data comprises data defining instructions for handling the unknown event.

7. A method according to any preceding claim, wherein the protocol is for use of an ISDN communications channel.

5 8. A communications system comprising;

a first terminal,

a second terminal interconnectable with the first via a telecommunications network, and

a store connected to said network;

10 in which:

the second terminal is arranged to communicate using a communications protocol defining a set of responses to respective conditions;

the first terminal is arranged to store, and communicate using, a subset of said protocol; and

15 the store is arranged to cooperate with the first terminal for handling conditions requiring a response within the set but not the subset.

9. A communications terminal for use with a communications protocols defining a set of responses to respective predetermined events, comprising;

20 a communications port for connection to a communications channel;

a signalling port for connection to a signalling channel; and

a store for storing data defining a core subset of said responses corresponding to a core subset of said events; and

25 a controller for controlling communications via the communications and signalling ports in accordance with said core subset;

the terminal being arranged to detect events not within said core subset, and to receive event-handling data via said signalling port, and

the controller being arranged to handle said detected events in accordance with said received event-handling data.

30

10. A terminal according to claim 9, in which said store is rewritable, and the terminal is arranged to store therein data derived from said event-handling data, and corresponding to one or more responses of said set which are not of said core

subset, and the controller is for controlling communications via the communications and signalling ports in accordance with said core subset and said stored additional responses.

5 11. A terminal according to claim 10, the terminal being arranged to erase said additional responses under predetermined conditions.

12. A terminal according to claim 9, in which said controller is arranged to accept said event-handling data as one or more communications signalling
10 instructions for immediate execution.

13. A terminal according to claim 9, the terminal being arranged to signal said detected events via said signalling port and to receive said event-handling data in response thereto.

15

14. A terminal according to claim 13, the terminal being arranged to signal, for each said detected event, the internal state of the terminal prior to receipt thereof via said signalling port.

20 15. A terminal according to claim 9, wherein said store does not comprise a movable magnetic storage medium.

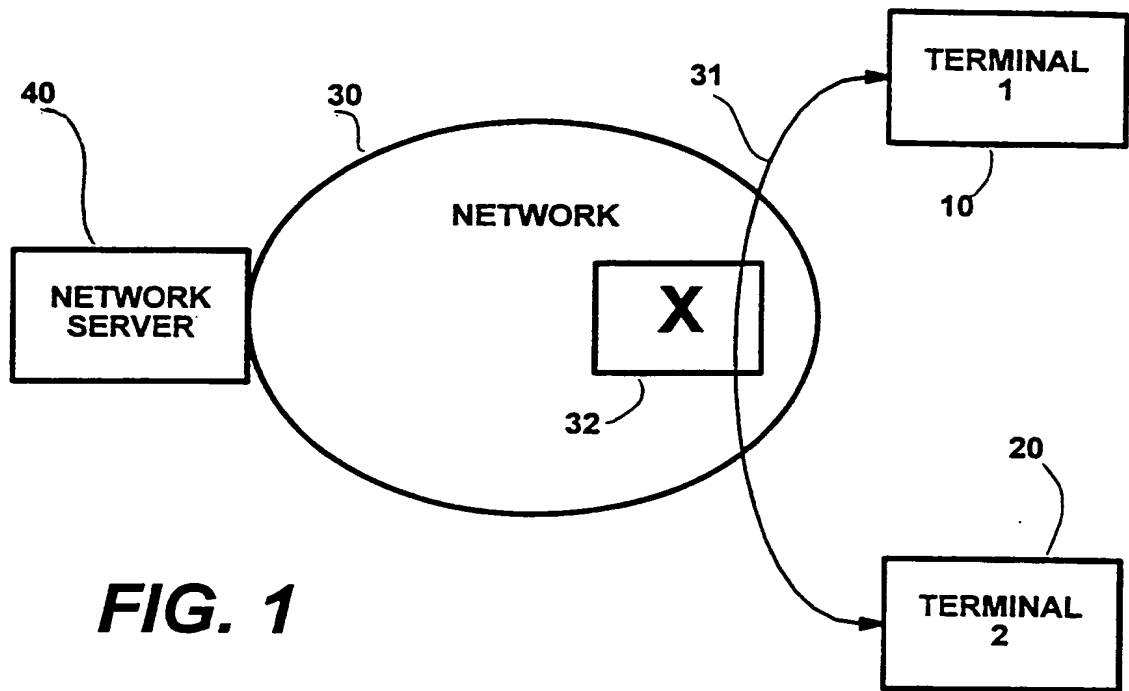
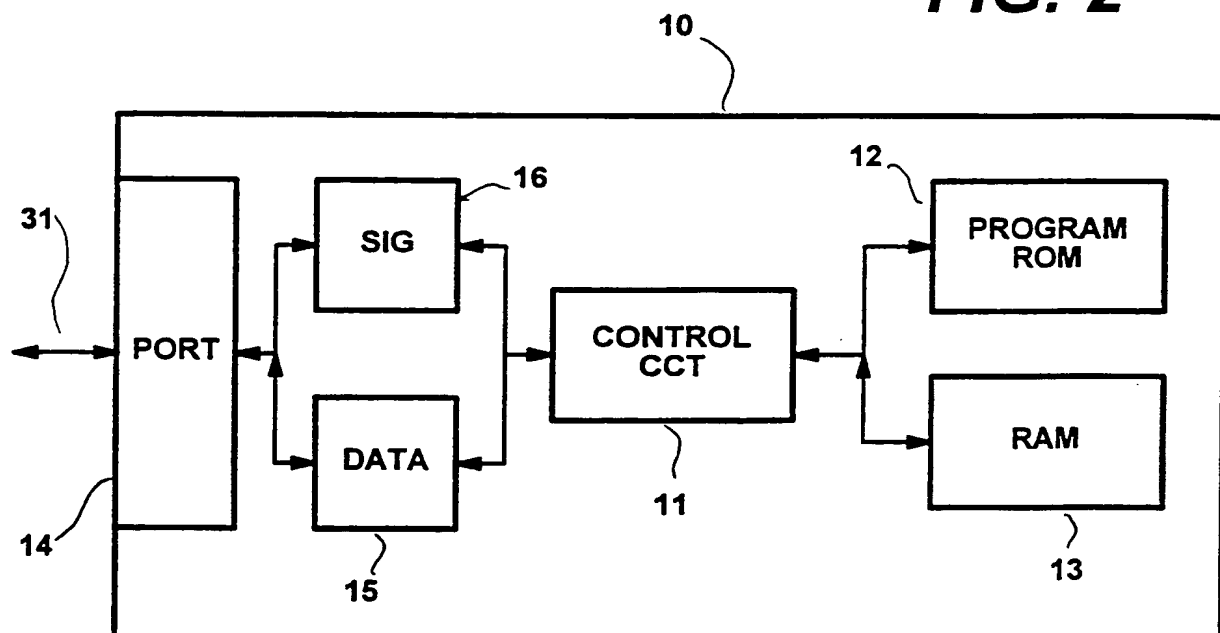
16. A terminal according to claim 15, which lacks a movable magnetic storage medium.

25

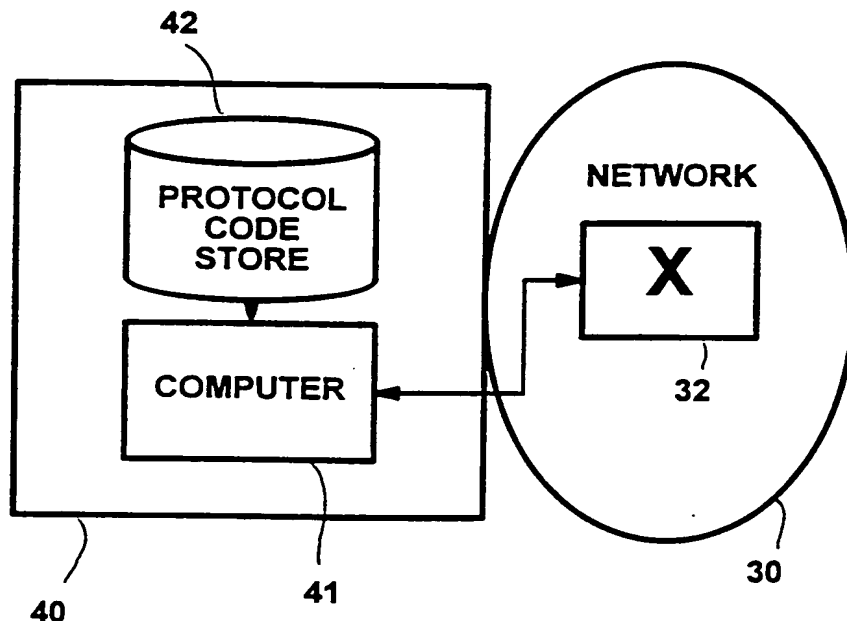
17. A terminal according to claim 9, which comprises a network client terminal.

18. A terminal according to claim 17, which comprises a video output port for
30 co-operation with a television set.

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**FIG. 1****FIG. 2**

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**FIG. 3**

Exception_Request

200

Parameter	Parameter Description
202 Current State	Q2931 state currently in
204 Exception Trigger	Choice of Input/Time-out/Parameter. This will distinguish what has caused the exception
206 Exception Input	Required for Input trigger and probably Parameter trigger
208 Exception Time-out	Name of expired timer
210 Exception Parameter List	List of unidentified parameters

(a)

250

Exception_Response

Parameter	Parameter Description
212 Task List	List of tasks that the access signalling process must perform e.g. parameter value assignment, decisions
214 Output	Any output message that needs to be sent
216 Next State	Q2931 state after tasks and output

(b)

FIG. 6

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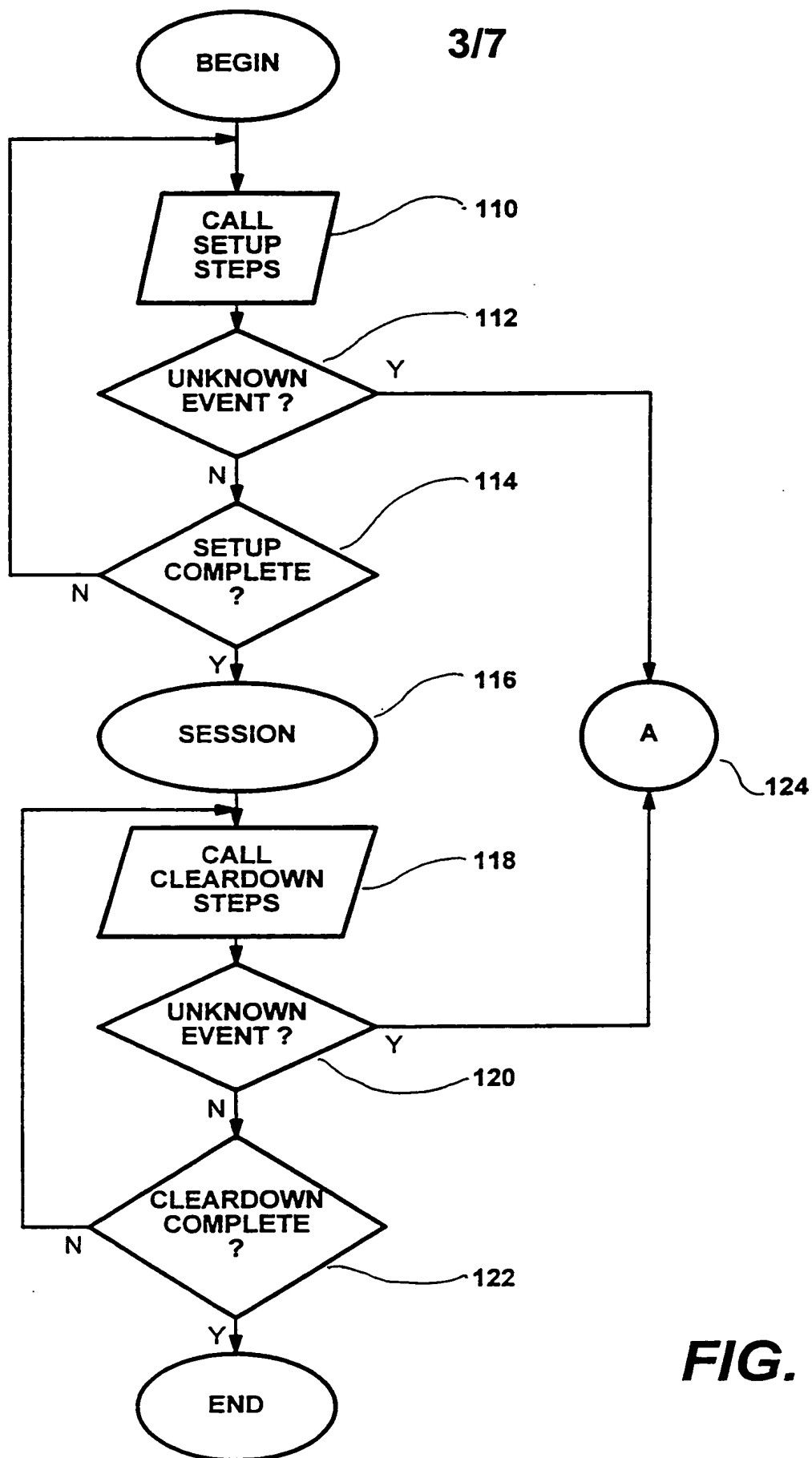
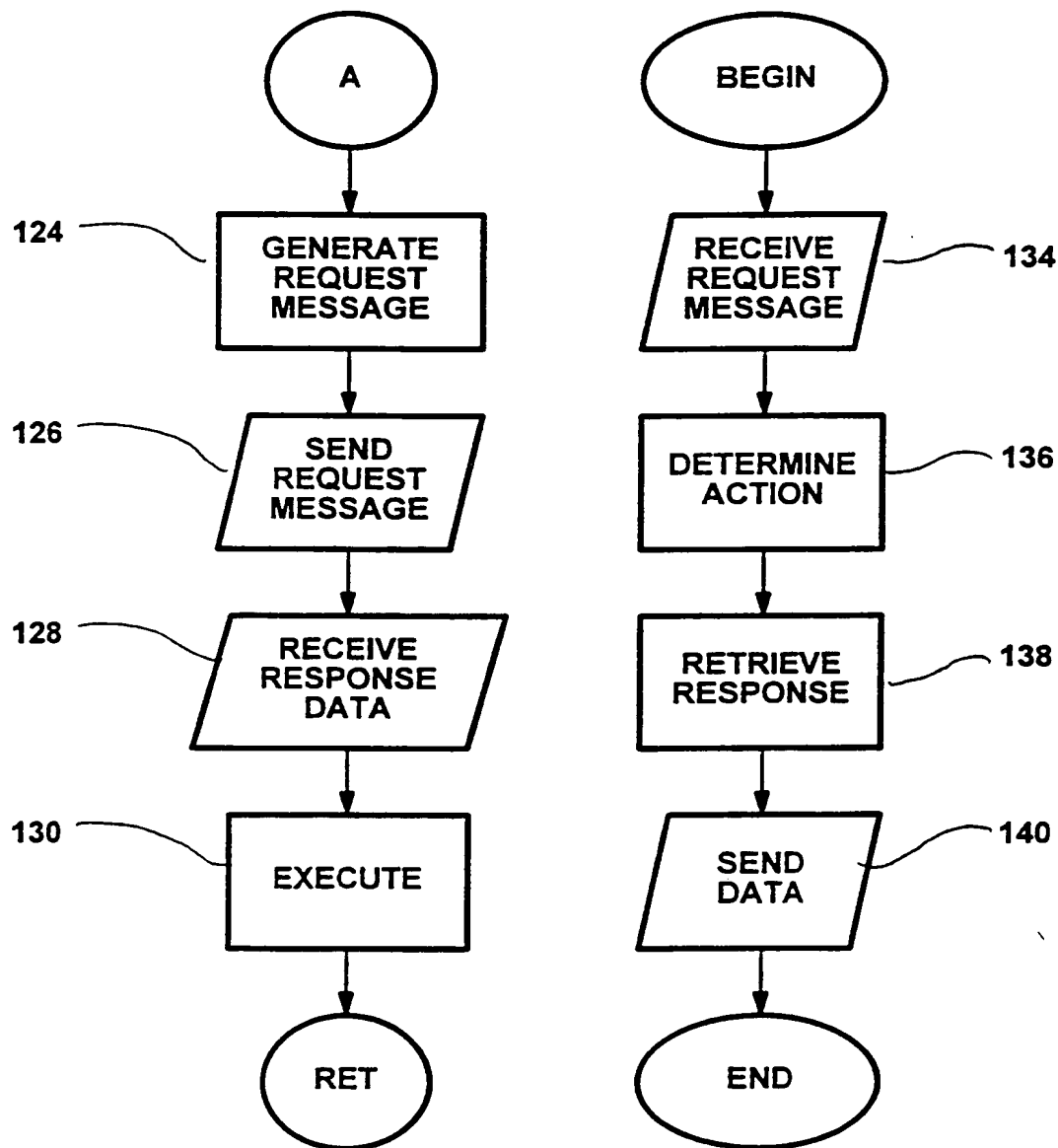
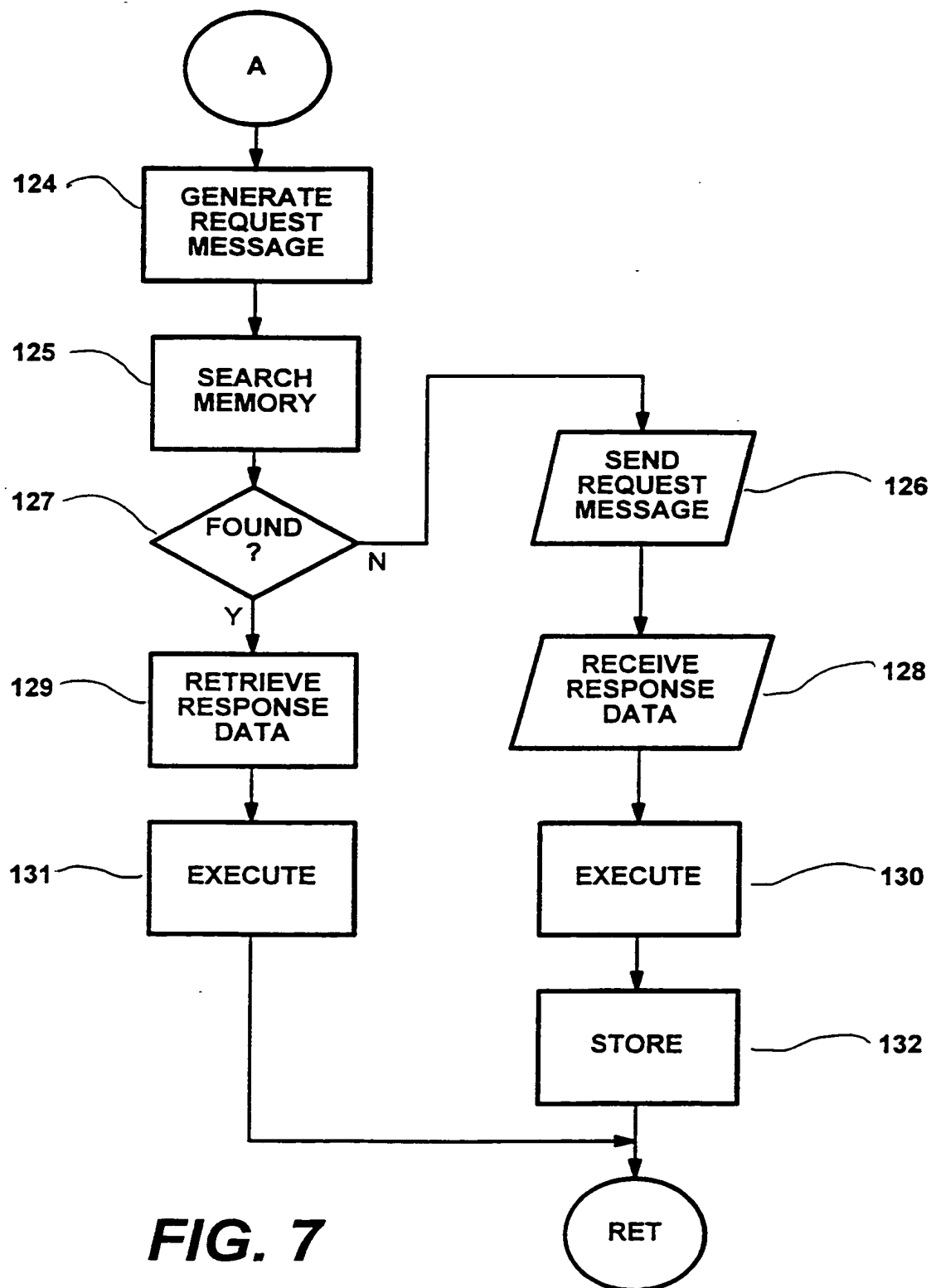


FIG. 4

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**FIG. 5a****FIG. 5b**

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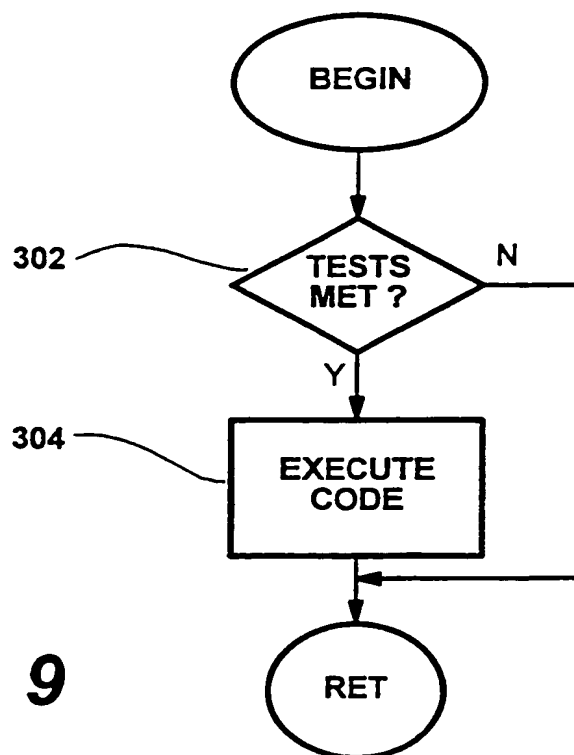
**FIG. 7**

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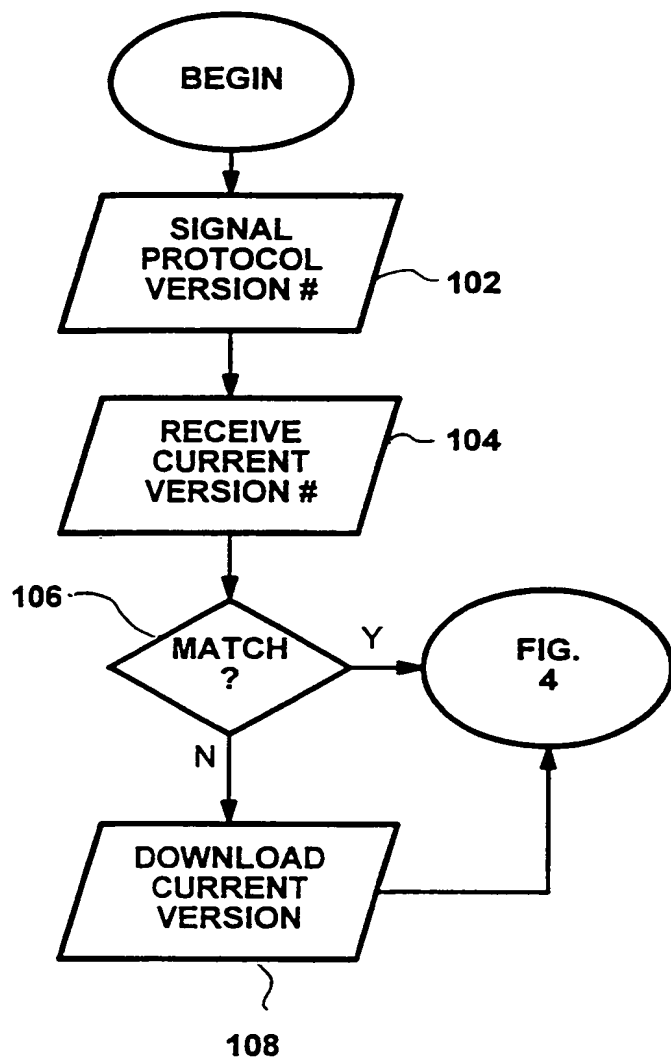
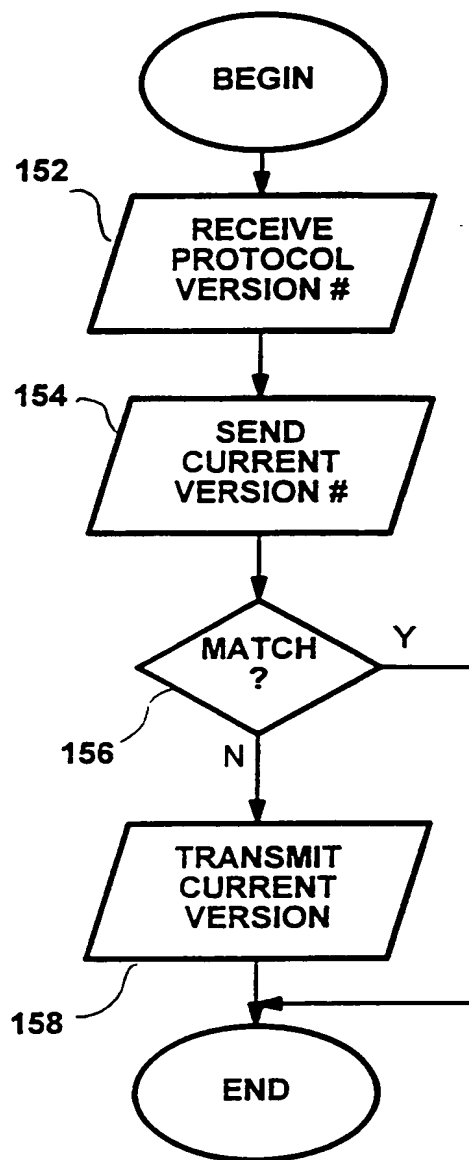
201

Exception_Response

Parameter	Parameter Description
Code	Executable code for action(s) that the access signalling process must perform

FIG. 8**FIG. 9**

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**FIG. 10a****FIG. 10b**

INTERNATIONAL SEARCH REPORT

nal Application No

PCT/GB 99/00986

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04Q11/04 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 48238 A (NORTHERN TELECOM INC) 18 December 1997 (1997-12-18) abstract; figures 1-3 page 5, line 10 - page 12, line 23 ---	1-18
X	SRINIVAS CHAGANTY ET AL: "INTERFACING WITH NETWORK ELEMENTS FOR NETWORK MANAGEMENT AND CONTROL" PROCEEDINGS OF THE PACIFIC RIM CONFERENCE ON COMMUNICATIONS, COMPUT AND SIGNAL PROCESSING, VICTORIA, CA, MAY 9 - 10, 1991, vol. 2, 9 May 1991 (1991-05-09), pages 685-687, XP000280389 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS paragraphs "Introduction"; "A Solution" ; "Network Interface Control"; figure 1 --- -/--	1,8,9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Patent Application No

PCT/GB 99/00986

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